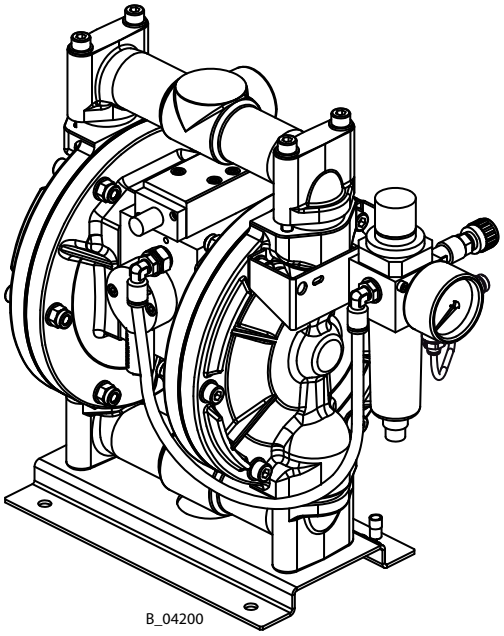
WAGNER

Translation of the Original Operating Manual

PM500

Version 01/2013

Pneumatic Double Diaphragm Pump PM500



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1 ABOUT THESE INSTRUCTIONS

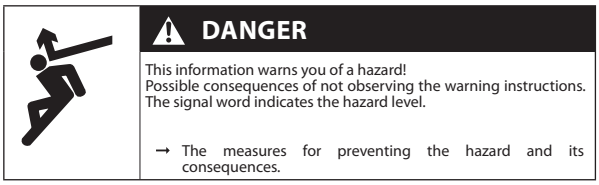
1.1 PREFACE

The operating manual contains information about safely operating, maintaining, cleaning and repairing the device.
The operating manual is part of the device and must be available to operating and service staff.
Operating and service personnel should be instructed according to the safety instructions.
The device may only be operated in compliance with this operating manual.
This equipment can be dangerous if it is not operated according to the definitions in this operating manual.

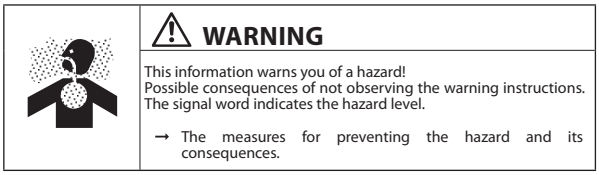
1.2 WARNINGS, NOTICES AND SYMBOLS IN THESE INSTRUCTIONS

Warning instructions in this operating manual highlight particular dangers to users and device and state measures for avoiding the hazard. These warning instructions fall into the following categories:

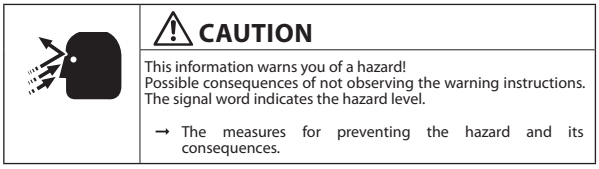
Danger - immediate risk of danger.
Non-observance will result in death or serious injury.



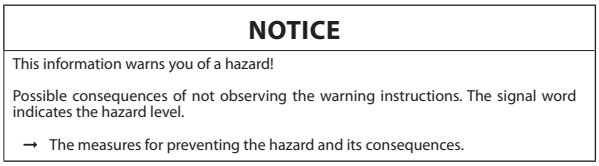
Warning - possible imminent danger.
Non-observance may result in death or serious injury.



Caution - a possibly hazardous situation.
Non-observance may result in minor injury.



Notice - a possibly hazardous situation.
Non-observance may result in material damage.



Note - provides information about particular characteristics and how to proceed.

1.3 LANGUAGES

The operating manual is available in the following languages:

Language:	Order No.	Language:	Order No.
German	2335746	English	2335747
Italian	2335748	French	2335750
Spanish	2335752		

1.4 ABBREVIATIONS IN THE TEXT

Stk	Number of pieces
Pos	Position
K	Marking in the spare parts lists
Order No.	Order No.
DH	Double stroke

Materials:	
PTFE	Polytetrafluorethylene
EPDM	Ethylene-propylene-diene monomer (rubber)

2 CORRECT USE

2.1 DEVICE TYPES

Metallic versions (aluminum):
Pneumatic double diaphragm pumps with Order No.

PM500
U509.A0
U509.A0A

2.2 TYPE OF USE

The device is suitable for processing liquid materials like paints and varnishes in accordance with the classification into explosion classes IIA or IIB.

2.3 USE IN AN EXPLOSION HAZARD AREA

The pneumatic double diaphragm pumps can be employed in explosion hazard zones (Zone 1).

2.4 SAFETY PARAMETERS

WAGNER accepts no liability for any damage arising from incorrect use.

- → Use the device only to work with the materials recommended by WAGNER.
- → Only operate the device as a whole.
- → Do not deactivate safety fixtures.
- → Use only WAGNER original spare parts and accessories.

The operation of the pneumatic double diaphragm pump is only allowable under the following conditions:

- → The operating staff have previously been trained on the basis of this operating manual.
- → The safety regulations listed in this operating manual must be observed.
- → The operating, maintenance and repair information in this operating manual must be observed.
- → The statutory requirements and accident prevention regulation standards in the country of use must be observed.

2.5 PROCESSIBLE MATERIALS

- → Fluid materials like paints and varnishes.

NOTICE
Abrasive materials and pigments! Greater wear of parts carrying the material. → Use the application-oriented model (flow rate/cycle, material, valves, etc.) as indicated in Chapter 5.3.2. → Check if the fluids and solvents used are compatible with the pump construction materials as indicated in Chapter 5.3.1.

2.6 REASONABLY FORESEEABLE MISUSE

The following is prohibited:
- → coating work pieces which are not grounded,
- → unauthorized conversions and modifications to the device,
- → processing dry or similar coating materials, and
- → using defective components and spare parts and accessories other than those described in Chapter 10 of this operating manual.

The forms of misuse listed below may result in health issues and/or equipment damage:
- → use of powder as coating material and
- → incorrectly set values for processing.

Wagner double diaphragm pumps are not designed for pumping food.

2.7 RESIDUAL RISKS

Residual risks are risks which cannot be excluded even in the event of correct use.
If necessary, warning and prohibition signs at the relevant points of risk indicate residual risks.

Residual risk	Source	Consequences	Specific measures	Lifecycle phase
Skin contact with paints and cleaning agents	Handling of paints and cleaning agents	Skin irritations, allergies	Wear protective clothing, observe safety data sheets	Operation, maintenance, disassembly
Paint in air outside the defined working area	Painting outside the defined working area	Inhalation of substances which are hazardous to health	Observe working and operating instructions	Operation, maintenance

3 IDENTIFICATION

3.1 EXPLOSION PROTECTION IDENTIFICATION

Metallic versions (aluminum):
Pneumatic double diaphragm pumps with Order No.

PM500
U509.A0
U509.A0A

As defined in the Directive 94/9/EC (ATEX 95), the device is suitable for use in areas where there is an explosion hazard.

CE Ex	II 2G IIB T4 +4°C ambient temperature to +40°C
CE:	European Communities
Ex:	Symbol for explosion protection
II:	Device class II
2:	Category 2 (Zone 1)
G:	Ex-atmosphere gas
IIB:	Explosion group
T4:	Temperature class: maximum surface temperature < 135 °C; 275 °F
Ambient temperature	+4 °C to +40 °C: permissible ambient temperature area

3.2 MAXIMUM SURFACE TEMPERATURE

Maximum surface temperature:	the same as the permissible material temperature.
Permissible material temperature:	+4÷90 °C; +39÷194 °F
Permissible ambient temperature:	+4÷40 °C; +39÷104 °F

4 GENERAL SAFETY INSTRUCTIONS

4.1 SAFETY INSTRUCTIONS FOR THE OPERATOR

→ Keep this operating manual at hand near the device at all times.
→ Always follow local regulations concerning occupational safety and accident prevention.

4.1.1 ELECTRICAL EQUIPMENT

Electrical devices and equipment
→ To be provided in accordance with the local safety requirements with regard to the operating mode and ambient influences.
→ May only be maintained by skilled electricians or under their supervision.
→ Must be operated in accordance with the safety regulations and electrotechnical regulations.
→ Must be repaired immediately in the event of problems.
→ Must be decommissioned if they pose a hazard.
→ Must be de-energized before work is commenced on active parts. Inform staff about planned work. Observe electrical safety regulations.

4.1.2 PERSONNEL QUALIFICATIONS

→ Ensure that the device is operated and repaired only by trained persons.

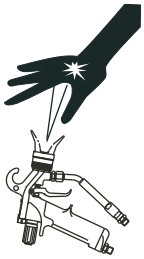
4.1.3 SAFE WORK ENVIRONMENT

→ Make sure that the floor in the area where you are working is electrostatically conductive in accordance with EN 61340-4-1.
→ Ensure that all persons within the working area wear electrostatically conductive shoes.
→ Ensure that during spraying, persons wear electrically conductive gloves. The grounding takes place via the spray gun handle.
→ Paint mist extraction systems must be fitted on site according to local regulations.
→ Ensure that the following components of a safe working environment are available:
– Material/air hoses adapted to the working pressure.
– Personal safety equipment (breathing and skin protection).
→ Ensure that there are no ignition sources such as naked flames, sparks, glowing wires or hot surfaces in the vicinity. Do not smoke.

4.2 SAFETY INSTRUCTIONS FOR STAFF

→ Always follow the information in these instructions, particularly the general safety instructions and the warning instructions.
→ Always follow local regulations concerning occupational safety and accident prevention.

4.2.1 SAFE HANDLING OF WAGNER SPRAY DEVICES



The spray jet is under pressure and can cause dangerous injuries.
Avoid injection of paint or cleaning agents:
→ Never point the spray gun at people.
→ Never reach into the spray jet.
→ Before all work on the device, in the event of work interruptions and functional faults:
- Switch off the energy/compressed air supply.
- Secure the spray gun against actuation.
- Relieve the pressure from the spray gun and device.
In the event of functional faults: remedy the fault as described in the "Trouble Shooting" chapter.
→ The liquid emitters are to be checked for safe working conditions by an expert (e.g. Wagner Service Technician) as often as necessary or at least every 12 months, in accordance with the guidelines for liquid emitters (ZH 1/406 and BGR 500 Part 2 Chapter 2.36).
– For shut down devices, the examination can be suspended until the next start-up.

In the event of skin injuries caused by paint or cleaning agents:
→ Note down the paint or cleaning agent that you have been using.
→ Consult a doctor immediately.

Avoid danger of injury through recoil forces:
→ Ensure that you have firm footing when operating the spray gun.
→ Only hold the spray gun briefly in a position.

4.2.2 GROUNDING THE UNIT

In order to avoid electrostatic charging of the device, the device must be grounded.
Friction, flowing liquids and air or electrostatic coating processes create charges. Flames or sparks can form during discharge.
→ Ensure that the device is grounded for every spraying operation.
→ Ground the work pieces to be coated.
→ Ensure that all persons inside the working area are grounded, e.g. that they are wearing electrostatically conductive shoes.
→ Wear electrostatically conductive gloves when spraying. The grounding takes place via the spray gun handle.

4.2.3 MATERIAL HOSES

→ Ensure that the hose material is chemically resistant to the sprayed materials.
→ Ensure that the material hose is suitable for the pressure generated in the device.
→ Make sure that the hoses are laid only in suitable places. In no case, should hoses be laid in the following places:
- in high-traffic areas,
- on sharp edges,
- on moving parts or
- on hot surfaces
→ Make sure that the hoses are never used to pull or move the equipment.
→ The electrical resistance of the complete high pressure hose must be less than 1 MOhm.

Several liquids have a high expansion coefficient. In some cases its volume can rise with consequent damage to hoses, fittings and cause fluid leakage.
When the pump sucks liquid from a closed container, ensure that air or suitable gas can enter the container to avoid a vacuum being generated in the container itself. Thus a negative pressure is avoided. The vacuum could implode the container (squeeze) and can cause it to break. The container would leak and the liquid would flow out.
The pressure ratio is 1:1. Therefore the pressure generated by the pump is equal to the input air pressure.

4.2.4 CLEANING

- → De-energize the device electrically.
- → Disconnect the pneumatic supply line.
- → Relieve the pressure from the device.
- → Ensure that the flash point of the cleaning agent is at least 5 K above the ambient temperature.
- → To clean, use cloths and brushes moistened with solvent. Never use hard objects or spray on cleaning agents with a gun.

An explosive gas/air mixture forms in closed containers.
- → When cleaning devices with solvents, never spray into a closed container.
- → Ground the container.

4.2.5 HANDLING HAZARDOUS LIQUIDS, VARNISHES AND PAINTS

- → When preparing or working with paint and when cleaning the unit, follow the working instructions of the manufacturer of the paints, solvents and cleaning agents being used.
- → Take the specified protective measures. In particular, wear safety goggles, protective clothing and gloves, as well as hand protection cream if necessary.
- → Use a mask or a breathing apparatus if necessary.
- → For sufficient health and environmental safety: Operate the device in a spray booth or on a spraying wall with the ventilation (extraction) switched on.
- → Wear suitable protective clothing when working with hot materials.

4.2.6 TOUCHING HOT SURFACES

- → Touch hot surfaces only if you are wearing protective gloves.
- → When operating the unit with a coating material with a temperature of > 43 °C; 109.4 °F:
  - Identify the device with a warning sticker "Warning - hot surface".

Order No.	
9998910	Instruction sticker
9998911	Protection sticker

Note: Order the two stickers together.

4.2.7 EXPLOSION HAZARD

Never use chloride or halogenated solvents (such as trichloroethane and methylene chloride) with units containing aluminium or galvanized and zinc-plated parts. They may react chemically thus producing an explosion danger.
Read the classification and information leaflet concerning the product and solvent to be used.

4.2.8 NOISE RISK

In some working conditions, the pump can be particularly noisy: for example when the compressed air supply is high and when there is no pressure or a very low pressure in the pumped fluid (free flow operation). In these cases, all personnel working next to the pump shall wear adequate individual protections and/or use valves and seats in plastic material, provided the working conditions and the compatibility with the pumped fluid allow it.

4.2.9 MATERIAL CHEMICAL COMPATIBILITY

Make sure that the pump's construction materials are chemically compatible with the fluid to be pumped. A wrong choice can cause harm to persons (as a result of the influence of harmful products and products which irritate skin) as well as polluting the environment, along with premature damage to the pump and its hoses.

4.2.10 EMERGENCY STOP

To quickly stop the unit in case of an emergency, close the air cut-off valve or the pressure regulator to interrupt the air supply to the pump's motor. The cut-off valve is not supplied with the pump. It must be provided and properly installed by the user.
Caution: The pneumatic pumps' delivery circuits can remain pressurized, even when the air cut-off valve is closed.

4.2.11 TIGHTNESS CHECK

When using the pump after a long period of inactivity, check tightness of all parts subject to pressure.

4.2.12 MAINTENANCE

Depending on the type of use and the substances used, the user has to check for the presence of deposits on the pump as well as check its cleanliness at regular intervals and the state of wear of the components and proper operation of the pump assembly.
The operation must be carried out in conformity with what is written in this manual.

4.3 USE IN AREAS SUBJECT TO EXPLOSION HAZARDS

Only the pneumatic double diaphragm metallic pumps (aluminium) can be used in explosion hazard zones. The following safety regulations must be observed and followed.

4.3.1 SAFETY REGULATIONS

Safe handling of WAGNER spray devices
Mechanical sparks can form if the device comes into contact with metal.
In an explosive atmosphere:
→ Do not knock or push the device against steel or rusty iron.
→ Do not drop the device.
→ Use only tools that are made of a permitted material.

Ignition temperature of the pumped material
→ Check that the ignition temperature of the pumped material is higher than the max. allowable surface temperature.

Medium supporting atomizing
→ To atomize the material, use only weakly oxidizing gases, e.g. air.

Surface spraying, electrostatic
→ Do not spray system parts with electrostatic.

Cleaning
If there are deposits on the surfaces, the device may form electrostatic charges. Flames or sparks can form during discharge.
→ Remove deposits from the surfaces to maintain conductivity.
→ Use only a damp cloth to clean the device.

4.3.2 OPERATION WITHOUT FLUID

Avoid running the pump sucking air (without fluid inside). The air, combined with the vapor of flammable fluids, can generate internal areas with an explosion hazard.
Periodically check that the pump is working regularly, paying special attention to the presence of air in the pumped fluid, which may be caused by a breakage in the pump.
Avoid operating the pump with damaged diaphragms.

4.3.3 MAXIMUM SURFACE TEMPERATURE

The maximum surface temperature of the pump depends on the temperature of the pumped fluid, that must not exceed the values indicated in the "Technical Data" chapter.

4.3.4 MAXIMUM SURFACE TEMPERATURE - EXOTHERMIC REACTIONS

Fluids incompatible with the pump's materials or particularly reactive mixtures of products with several components may cause exothermic reactions and develop dangerous temperatures or pressure.

4.3.5 CONNECTION PIPES

Connection pipes must be made of conductive material and properly grounded.

4.3.6 PUMP PROTECTION

If the pumping fluids contain solid particles, install a filter on the intake circuit. This prevents particles, that are large enough to damage the internal parts of the pump, from entering. Refer to the Technical Data chapter to verify the maximum size of solids that can be pumped.
Keep metal surfaces clean. Electric conductivity of the surfaces is essential for explosion protection.
Frequently clean the equipment so as to prevent insulating substance residue from accumulating.
Do not use rusted parts or metal tools that may cause sparks of a mechanical origin inside the explosion hazard area.

5 DESCRIPTION

5.1 AREAS OF APPLICATION

NOTICE

Abrasive materials and pigments!
Greater wear of parts carrying the material.

→ Use the application-oriented model (flow rate/cycle, material, valves, etc.) as indicated in Chapter 5.3.2.
→ Check if the fluids and solvents used are compatible with the pump construction materials as indicated in Chapter 5.3.1.

5.2 SCOPE OF DELIVERY

- Diaphragm pump

CE Conformity	see Chapter 11
Operating manual, German	Order No.: 2335746
Operating manual for other languages	see Chapter 1

The delivery note shows the exact scope of delivery.

5.3 DATA

5.3.1 MATERIALS OF THE FLUID TRANSPORTING PARTS

Order No.	Pump body	Diaphragm	Diaphragm disc	Valve seat	Valve ball	O-rings
U509.A0	Aluminum	PTFE	Stainless steel	Stainless steel	Stainless steel	EPDM
U509.A0A	Aluminum, nickel coated	PTFE	Stainless steel	Stainless steel	Stainless steel	EPDM

Positions of the individual parts: see spare parts list.

⚠ WARNING

Outgoing air containing oil!
Risk of poisoning if inhaled.
Air motor switching problems.

→ Provide compressed air free from oil and water (Quality Standard 5.5.4 according to ISO 8573.1) 5.5.4 = 40 µm / +7 / 5 mg/m³.

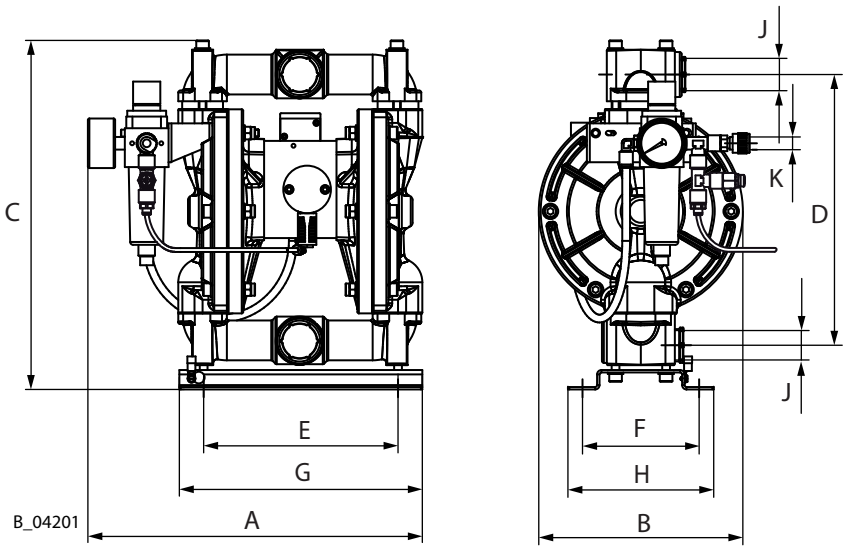
5.3.2 TECHNICAL DATA

Description		Unit	U509. A0	U509. A0A
Wetted parts materials			Aluminum	Aluminum, nickel coated
Transmission ratio			1:1	
Flow volume per double stroke (DH)		cm^3 cc	500	
Maximum operating pressure		MPa bar psi	1.0 10 145	
Maximum possible speed		DH/min	150	
Maximum flow rate (free flow - flooded inlet)		l/min GPM	75 19.8	
Minimum air inlet pressure		MPa bar psi	0.2 2.0 29	
Maximum air inlet pressure		MPa bar psi	1.0 10 145	
Air inlet connection (male)		BSP(R)	1/4"	
Maximum suction height	(1)	m ft	6.0 19.5	
Maximum solid body size		mm inches	3.5 0.14	
Sound pressure equivalent 40 cycles/min. (feeding 6 bar)	(2)	dB(A)	81	
Fluid connections (inlet & outlet bush)		BSP(G)	1"	
Weight		kg lb	13.8 30.5	
Maximum material pressure at the pump's inlet		MPa bar psi	0.1 1 14.5	
Material temperature		°C °F	+4 ÷ 90 +39 ÷ 194	
Ambient temperature		°C °F	+4 ÷ +40 +39 ÷ +104	
Allowable inclination for operation		<) °	10°	

(1) Start condition: Empty pump / dry valves

(2) LqA (10s)

5.3.3 DIMENSIONS AND CONNECTIONS



	PM500 mm; inch
A	344; 13.54
B	210; 8.27
C	359; 14.13
D	279; 10.98
E	200; 7.87
F	120; 4.72
G	250; 9.84
H	150; 5.90
J	G1" F
K	G1/4"

5.3.4 PERFORMANCE DIAGRAMS

Example

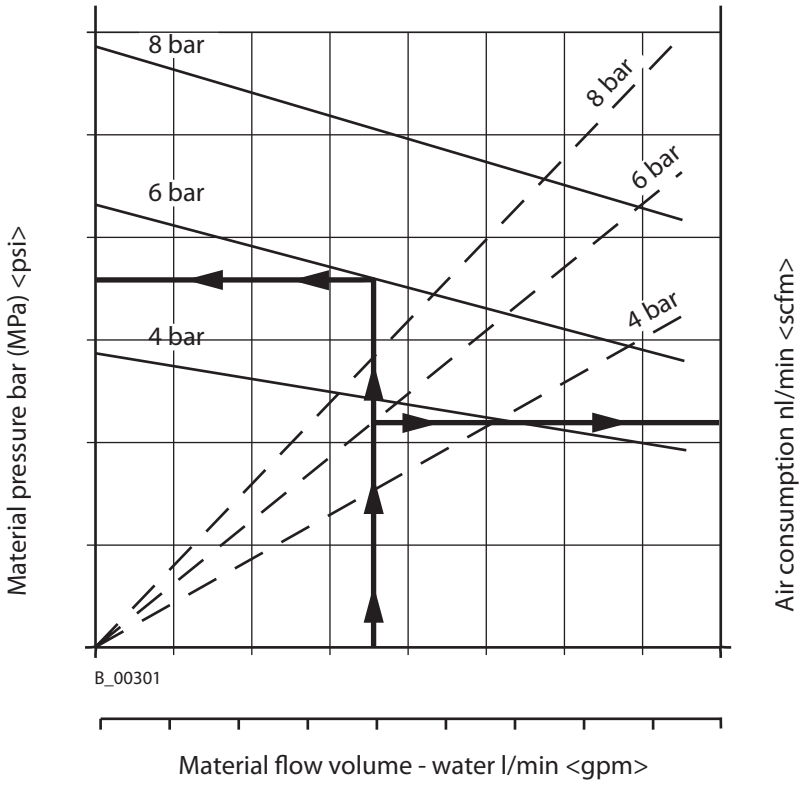
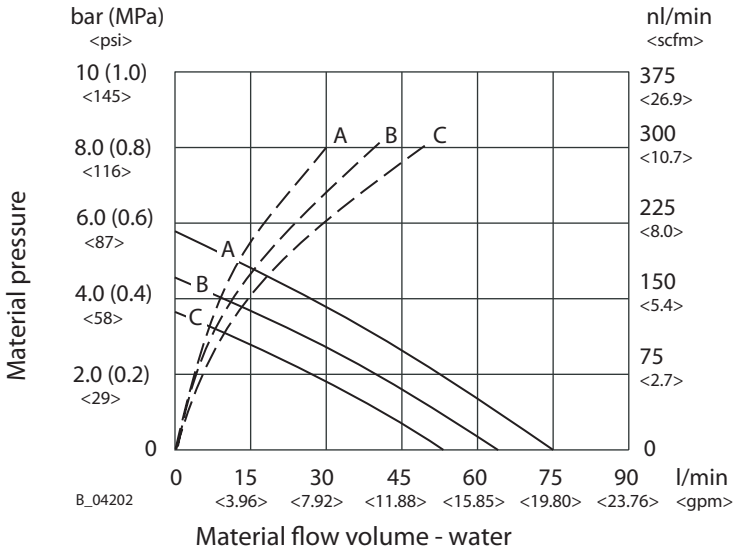


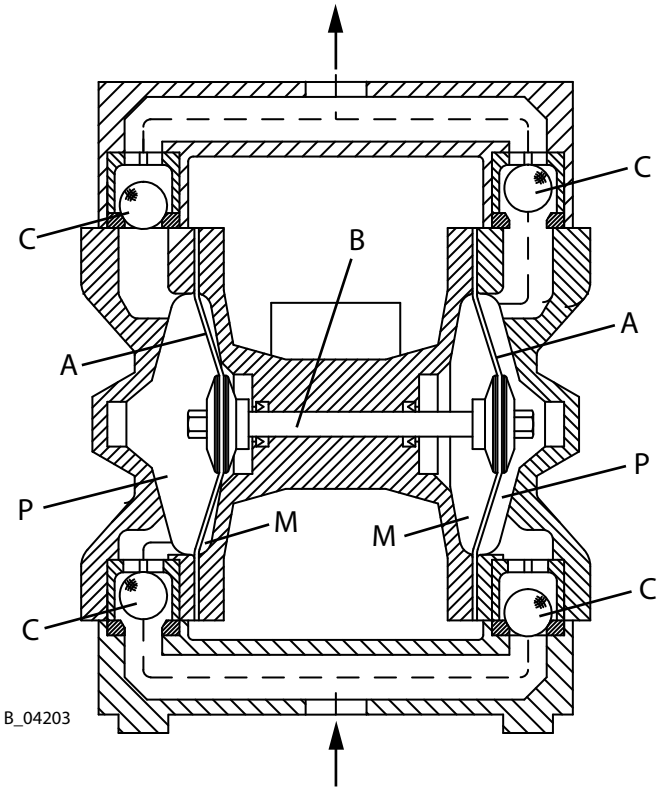
Diagram PM500



A = 6 bar; 0.6 MPa; 87 psi air pressure
B = 5 bar; 0.4 MPa; 58 psi air pressure
C = 4 bar; 0.4 MPa; 58 psi air pressure

The chart above refers to the aluminium version with stainless steel valves.

5.4 MODE OF OPERATION



Double diaphragm pump - operating principle
The double diaphragm pump is driven with compressed air.
Two diaphragms (A) are mechanically connected to each other by means of a shaft (B).
Each diaphragm generates two chambers: pumping chamber (P) and motor chamber (M).
A pneumatic distributor alternately supplies compressed air into one of the driving chambers (M), thus producing the diaphragm's movement and consequently causing one of the pumping chambers (P) to empty (as a result of volume decrease), while at the same time the other chamber (P) sucks the fluid in (as a result of volume increase). A series of four non-return valves (C) prevents the liquid from flowing back, thus producing the suction and delivery phases in each pumping chamber, and generating the pumping effect.
The PM500 models are equipped with a safety valve that opens when the maximum allowed value of compressed air supply is exceeded.

⚠ WARNING

Overpressure!
Risk of injury from bursting components.

→ Never change the safety valve setting.

6 ASSEMBLY AND COMMISSIONING

6.1 TRANSPORTATION

The pump may be moved manually, without lifts and cranes.

6.2 STORAGE

Store the pump in a closed and dry environment.
Thoroughly clean the pump, if a long-term decommissioning is planned.
When resuming pump operation, proceed as described in the following sections.

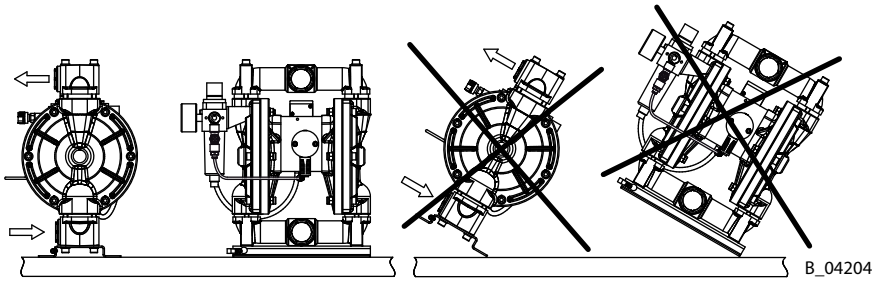
⚠ WARNING

Discharge of electrostatically charged components in atmospheres containing solvents!
Explosion hazard from electrostatic sparks.

→ Clean the pump only with a damp cloth.

6.3 ASSEMBLY

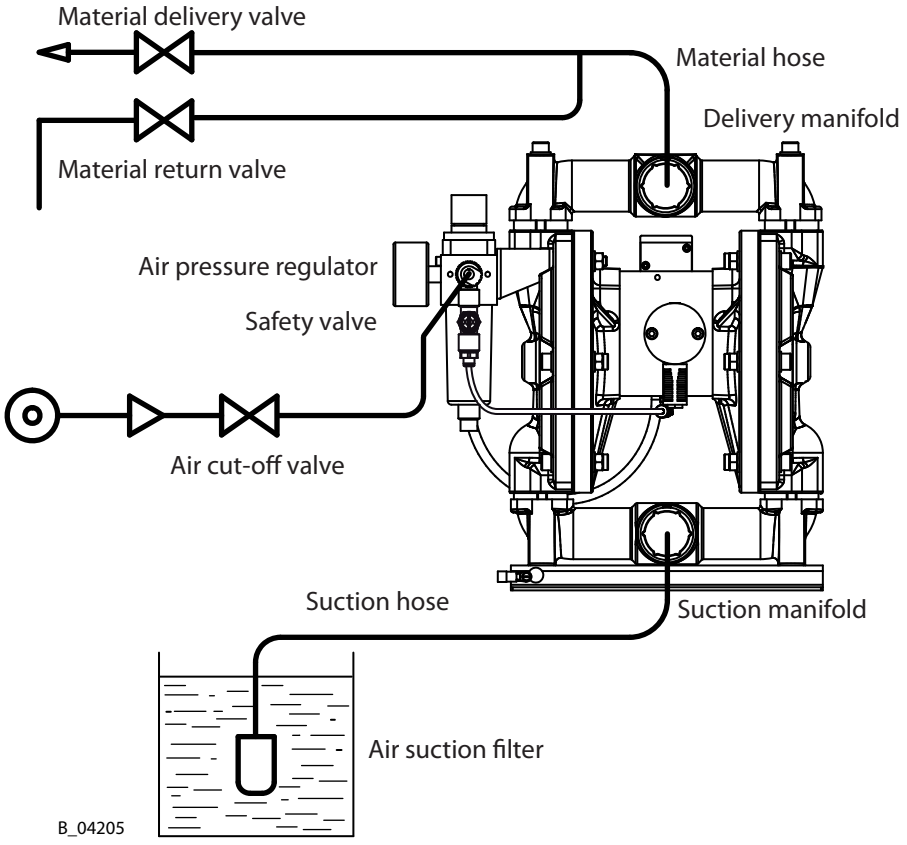
Install the pump on a flat and horizontal foundation and screw it on tightly.
Ensure that all fixing screws (diaphragm covers, manifold, covers) are correctly tightened.
Tighten the fixing screws regularly depending on pump use. In the case of continuous or prolonged operation, it is advisable to check at least once a week that there are no air and/or liquid leaks.



⚠ WARNING

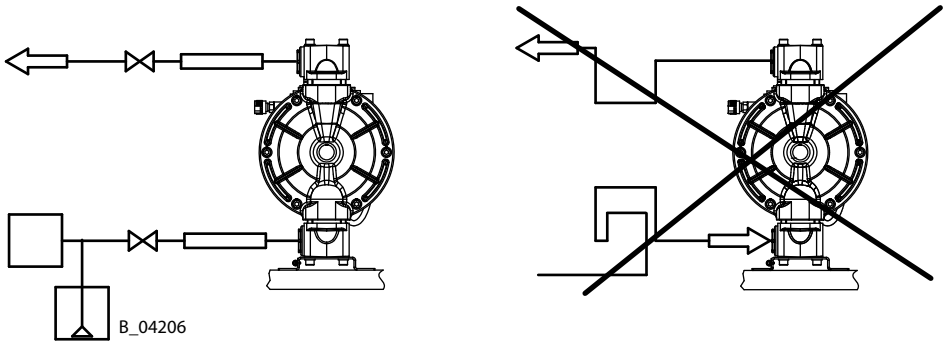
Inclined ground!
Risk of accidents if the device rolls away/falls.

→ Place the frame with the pump horizontally.
→ Secure frame.



Material connection:
Connect the pump's suction hose (on the underside) to the suction manifold. Connect it to the material hose's delivery manifold (on the upper side). Use flexible hoses to absorb the pump's vibrations. Ensure that the hoses are not mechanically stressing the pump. Never directly connect the pump to rigid pipes.
For pumps installed in areas subject to explosion hazards, all hoses and pipes must be made of conductive material and must be grounded.
Install a suction filter on the suction hose. This prevents particles, that are large enough to damage the internal parts of the pump, from entering. Refer to the Technical Data chapter to verify the maximum size of solids that can be pumped.

All hoses and components connected to the supply line must be able to operate at the pump's maximum pressure with the pump working at a pulsating pressure.
All items connected to the suction manifold must not get crushed as a result of the vacuum produced by the pump.
The suction and material hoses and pipes must have a cross-section proportional to the flow rate and the viscosity of the pumped fluid. Avoid long and winding pipes, especially during suctioning.



Compressed air connection:
The compressed air supply must be properly dimensioned.
Connect the pump's compressed air connection to the pressure distribution network.
The connection must be carried out on the pump's fitting. Do not replace the original connection.
Use a pipe with a suitable diameter for the connection.
Always mount an air cut-off valve and an air processing unit (filter/regulator unit).
The pressure must not exceed the maximum value indicated on the type plate.

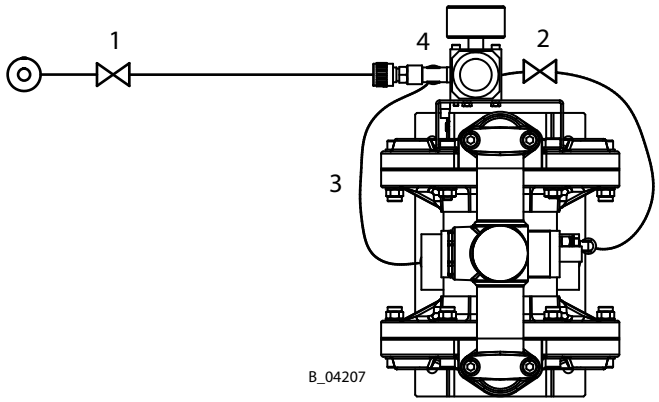
Air pressure quality:
The pneumatic motor must be supplied with clean and dry industrial air. Make sure efficient filter and condensation separation systems are installed on the air line.
The pump can be run with non-lubricated air.
Air pressure quality: 5.5.4 = 40 µm / +7 / 5 mg/m^3

Reversing valve:
The pump's reversing valve does not need any lubrication.

Safety valve:
The PM500 models are equipped with a safety valve that opens when the maximum allowed value of compressed air supply is exceeded.

Non-return valve:
If the pump has been installed on a higher level than the liquid to be pumped, it is recommended that a non-return valve be provided at the lower end of the suction pipe.

Installation of the air cut-off valve (1) for the emergency stop:
For the PM500 double diaphragm pump, an external air cut-off valve (1) must be installed before the filter pressure regulator (4) for the emergency stop is installed.



Installation of an on / off valve (2) for the start / stop operation:
If an on / off valve (2) for the normal start / stop operation is necessary, the on / off valve must be installed after the filter pressure regulator (4) so that the air supply (3) for the pilot valves is not interrupted. The control of the on / off valve can be made locally or remotely.

6.4 GROUNDING

⚠ WARNING

Discharge of electrostatically charged components in atmospheres containing solvents!
Explosion hazard from electrostatic sparks.

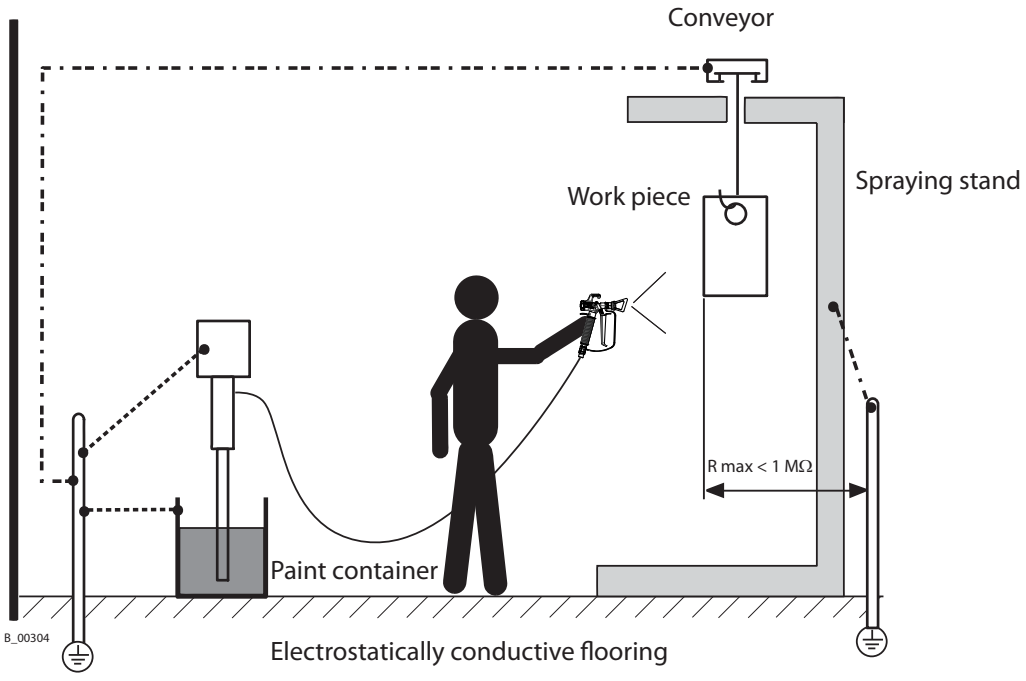
→ Clean the pump only with a damp cloth.

⚠ WARNING

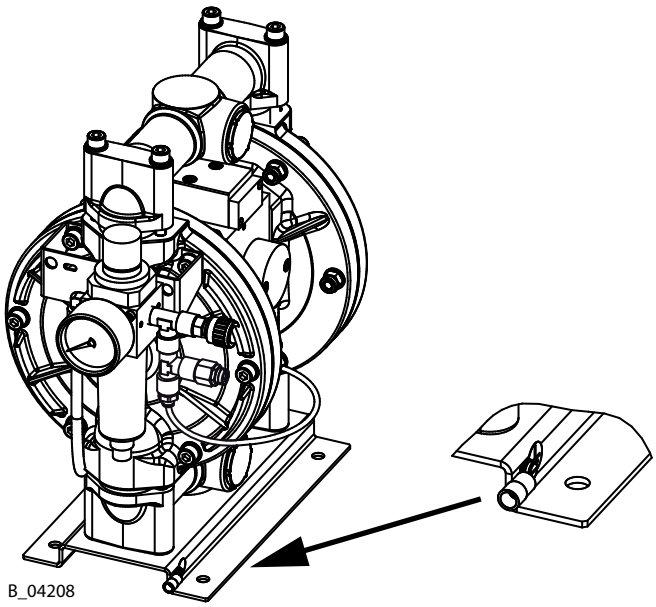
Heavy paint mist if grounding is insufficient!
Danger of poisoning.
Insufficient paint application quality.

→ Ground all device components.
→ Ground the work pieces to be coated.

Grounding schema (example)



The grounding connection is mandatory with PM500 pumps.


B_04208

Procedure:

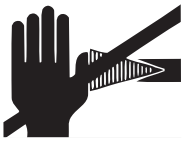
1. Remove the crimp connection delivered with the pump.
2. Crimp the grounding cable on the terminal and screw it back onto the pump's foot.
3. Ground the material/paint container to a local ground connection.
4. Ground the other parts of the system to a local ground connection.

6.5 COMMISSIONING

6.5.1 SAFETY REGULATIONS

Before carrying out any work, the following points must be observed in accordance with the operating instructions:

- Observe all safety regulations in accordance with Chapter 4.
- Carry out commissioning properly.



⚠ WARNING

High pressure spray jet!
Danger to life from injecting paint or solvent.

→ Never reach into the spray jet.
→ Never point the spray gun at people.
→ Consult a doctor immediately in the event of skin injuries caused by paint or solvent. Inform the doctor about the paint or solvent used.
→ Never seal defective high pressure parts, instead relieve the pressure from them and replace them.

⚠ WARNING

Toxic and/or flammable vapor mixtures!
Risk of poisoning and burns.

→ Operate the device in a spray booth approved for the working materials.
-or-
→ Operate the device on an appropriate spraying wall with the ventilation (extraction) switched on.
→ Observe national and local regulations for the outgoing air speed.

⚠ WARNING

Gas mixtures can explode if there is an incompletely filled pump!
Danger to life from flying parts.

→ Ensure that the pump and suction system are always completely filled with flushing agent or working medium.
→ Do not spray the device empty after cleaning.

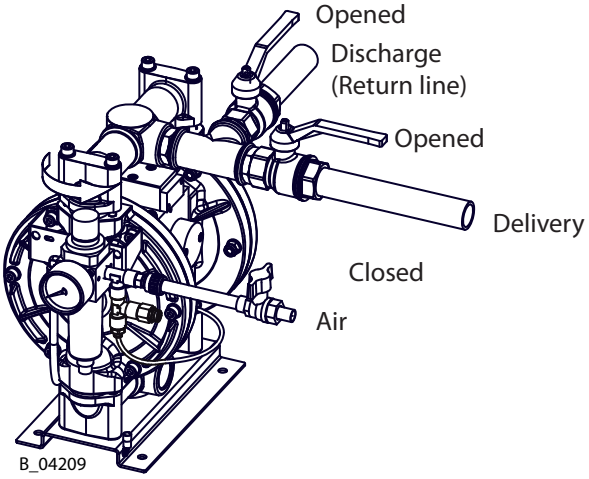
Emergency stop
In the case of unforeseen occurrences close the air cut-off valve immediately and open the return valve (if installed) and/or delivery devices (valves or guns).

6.5.2 PRELIMINARY OPERATIONS

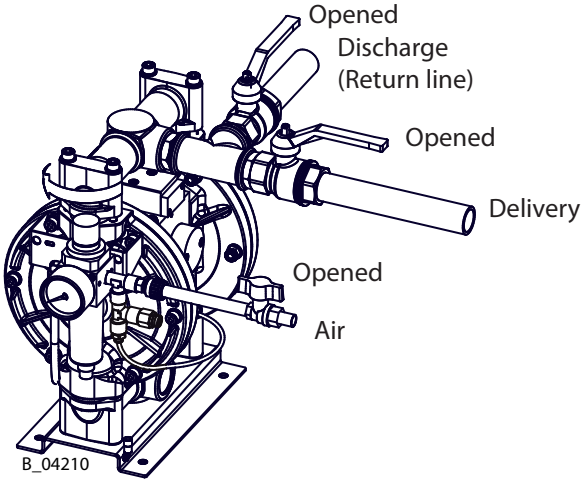
Preliminary cleaning

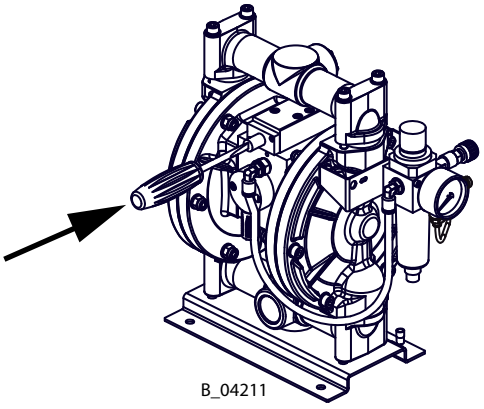
The pump was tested with oil or other fluids, depending on the model.
Before use, it is necessary to flush the pump once using an adequate solvent.
Ensure that:

- The pressure regulator knob is turned fully counterclockwise (0 bar pressure).
- The air cut-off valve is closed.
- The material delivery valve and the return valve, if installed, are opened.



Open the air cut-off valve and turn the regulator knob clockwise until the pump starts.





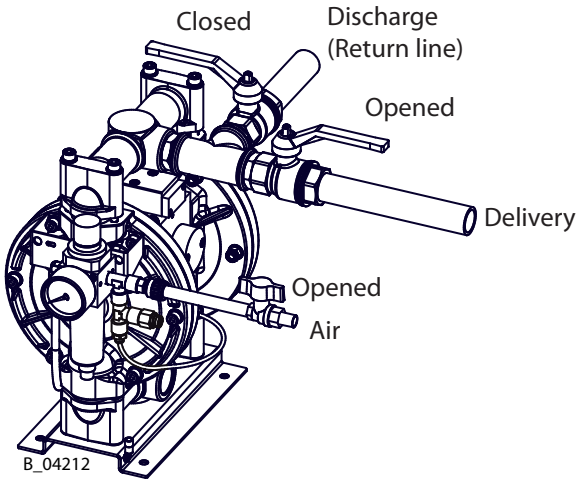
Start-up problems:

If the pump doesn't start up, carry out the following steps:

→ Turn the pressure regulator knob clockwise to a minimum of 2 bar.
→ Check if the air cut-off valve is open.
→ Press the actuation button on one end of the reversing valve until the reversing valve switches over. The air flows out audibly.
→ Turn the pressure regulator knob clockwise until the pump starts.

Don't let the pump run too quickly while suctioning.

Close the return valve, if installed.



Let the solvent flow through the pump for 2 or 3 minutes.

6.5.3 UNIT PRESSURE TIGHTNESS TEST

Close the material delivery valve, once the pump is primed.
Gradually increase the pressure until reaching the maximum allowed value for the pump and the devices connected to it. Ensure that no air or liquid escapes.

7 OPERATION

7.1 OPERATION

Suctioning:
Make sure that the air pressure regulator knob is turned fully counterclockwise (0 bar pressure).
Open the compressed air and material delivery valve, then increase the air pressure until the pump starts. Don't let the pump run too quickly while suctioning.

Return valve (if installed):
To facilitate the suctioning of the pump, open the return valve.
The return valve is strongly recommended in case of viscous materials or long pipes. Close the return valve when the suctioning has finished.

Material delivery:
The pump supplies the material while the material delivery valve is open.
Change the air pressure with the air pressure regulator, in order to achieve the desired amount or material pressure.

Drawn in air:
In case air accidentally flows into the pump suction inlet, the air pressure must immediately be reduced to avoid the pump working at an excessive speed.

Stopping the pump:
To stop the pump, simply close the material delivery valve or any other device (such as dispensing valves or guns) installed on the delivery line.

7.2 ENDING WORK

When the work is completed, close the air cut-off valve. Relieve the pressure in the material line, by opening the return valve (if installed) or the dispensing device (valve or spray gun).

Dealing with hardening liquids:
In case of hardening liquids such as 2-component mixed resins, the pump, and anything connected to it, must be thoroughly flushed out at the end of the working session by using a solvent suitable for the type of resin being used. The solvent must be left inside the pump, until its next use.

7.3 STORAGE OVER LONGER PERIODS OF TIME

When storing the device for longer periods of time, it is necessary to thoroughly clean it and protect it from corrosion. Use a suitable preserving fluid, according to the material of the wetted parts of the pump.

8 TROUBLE SHOOTING AND RECTIFICATION

Problem	Cause	Remedy
Pump does not work.	The air motor does not work or stops.	Turn the pressure regulator knob clockwise to a minimum of 2 bar.
		Press the actuation button on one end of the reversing valve until the reversing valve switches over. The air flows out audibly.
	No pressure indication (pressure regulator defective).	Disconnect compressed air supply briefly or repair or replace the pressure regulator.
	The delivery line is clogged.	Check the delivery line.
	Insufficient compressed air supply.	Check the compressed air supply.
	The filter in delivery line is clogged (if installed).	Clean or replace the filter.
The unit is working (i.e.: the pump is moving), but no fluid is delivered.	The suction filter is clogged (if installed).	Carefully clean the filter.
	No fluid is available at the pump's inlet.	Check the fluid level in the tank or container.
	The suction pipe is clogged or leaking (possibility of sucking air in from the atmosphere).	Check the suction pipe. Replace it if necessary.
The material flow is suspended.	The suction pipe is partially clogged.	Check the suction pipe. Replace it if necessary.
	Cavitation (air bubbles in the liquid).	Check the suction in the tank. Exclude air intake due to high viscosity.
	The non-return valve doesn't completely close.	Check for impurities on the valve seats. Replace the non-return valves if necessary.
The pump supply decreases during work.	Partial clogging of the delivery line.	Check the delivery line.
	Deviations of the material characteristics (like viscosity).	Check the material characteristics.
	Ice formation inside the air outlet pipes.	Check the compressed air quality. Install a condensation separator on the air line. Install an air dryer if necessary. If necessary, install an oiler and fill it with special de-icing fluid.

Problem	Cause	Remedy
The material delivery valve is closed, nevertheless the pump continues to run even if the air cut-off valve is closed.	The material delivery valve or the delivery manifold leaks.	Check the material delivery valve and the seals of the delivery manifold.
	Dirty or worn-out non-return valves in the delivery and suction manifold.	Clean the non-return valves and replace them if they are worn.

If the problem is not listed above, consult your WAGNER Service Center.

9 MAINTENANCE

⚠ WARNING

Incorrect maintenance/repair!
Danger to life and equipment damage.

→ Only a WAGNER service center or a suitably trained person may carry out repairs and replace parts.
→ Only repair and replace parts that are listed in the "Spare Parts Catalogue" chapter and that are assigned to the device.
→ Before all work on the device and in the event of work interruptions:
- Disconnect the control unit from the mains.
- Relieve the pressure from the spray gun and device.
- Secure the spray gun against actuation.
→ Observe the operating and service instructions at all times when carrying out work.

1. Check and clean the delivery and suction filters daily or as necessary.
2. Carry out each decommissioning as explained in Chapter 7.2.
3. As necessary, check and replace hoses, pipes, and connections daily.

→ In accordance with the guideline for liquid emitters (ZH 1/406 and BGR 500 Part 2 Chapter 2.36):
- The liquid emitters should be checked by an expert (e.g. Wagner service technician) for their safe working conditions as required and at least every 12 months.
- For shut down devices, the examination can be suspended until the next start-up.

9.1 SAFETY INSTRUCTIONS

Prior to maintenance and cleaning measures note:

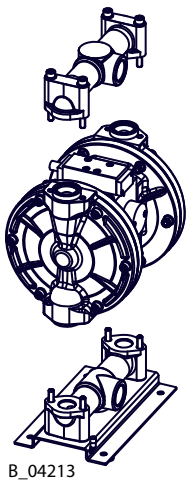
- → Wear protective clothing and use specific protection devices with regard to the nature of the fluids involved.
- → Close the compressed air supply and release the pressure from the pump and pipes connected to it.
- → Depending on the operation, disconnect the material and air side connection pipes.
- → Remove the pump from the base or support it is fastened to. Turn the pump upside-down over a container suitable for collecting any liquid it may contain.
- → After the pump has been reassembled and reinstalled following maintenance operations:
  Check the efficiency of the grounding connection of the individual parts of the pump.
  Carry out pressure retention test in accordance with Chapter 6.5.3. Check that no air or liquid escapes.

Note: All threads are right-hand threads.

9.2 DIAPHRAGM REPLACEMENT (PREVENTIVE MAINTENANCE)

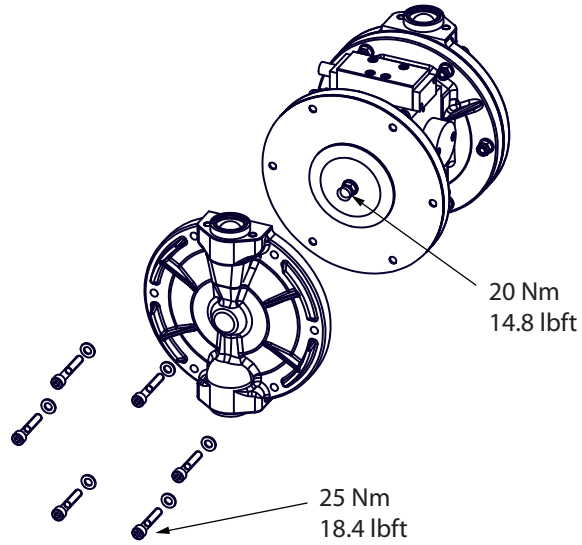
Mark the coupled parts (diaphragm covers, manifold, covers) with a felt-tip pen so as to make subsequent reassembly easier.
Note:
When executing the following operations it is imperative to avoid any rotation of the shaft in the motor block!

a) Remove the suction and delivery manifolds.



B_04213

b) Unscrew the mounting screws from only one of the diaphragm covers.
c) Unscrew the central nut and remove the first diaphragm. The diaphragm is composed of two layers: the material side and the air side.

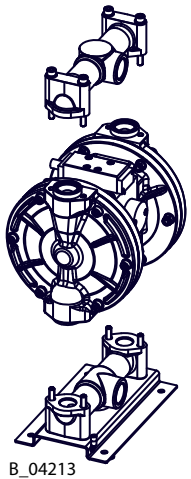


d) Clean the parts and replace the first diaphragm and the shaft's O-rings.
e) Remount the diaphragm cover.
f) Repeat steps b) to e) for the opposite side of the pump.
g) Remount the suction and delivery manifolds. Apply the right torques according to the directions in Chapter 10.2.

9.3 DIAPHRAGM REPLACEMENT (DUE TO BREAKAGE)

If the diaphragms are replaced as a result of breakage, all the internal parts of the motor must be cleaned and the condition of the seals and reversing valve, which may have been damaged by contact with the pump fluid, must be checked.
Mark the coupled parts (diaphragm covers, manifold, covers) with a felt-tip pen so as to make subsequent reassembly easier.

a) Remove the suction and delivery manifolds.
b) Unscrew the mounting screws from the two diaphragm covers and remove the diaphragm covers.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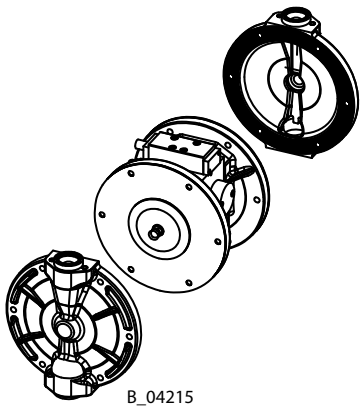
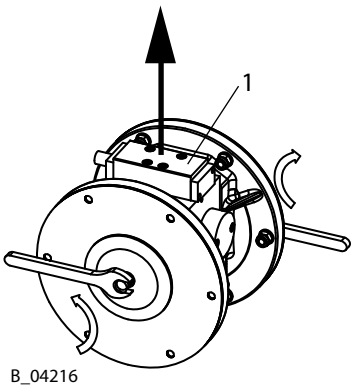

B_04215

c) Remove the reversing valve (1).
d) With the help of two wrenches located opposite each other (or hexagonal socket spanner and bench vice), loosen one of the central nuts and remove the first diaphragm (2). The diaphragm is composed of two layers: the material side and the air side.



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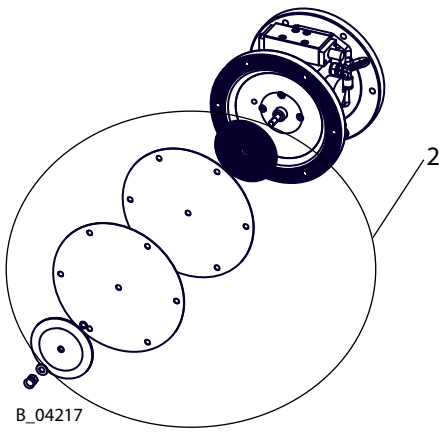
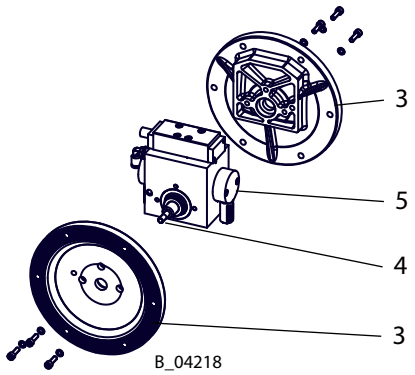
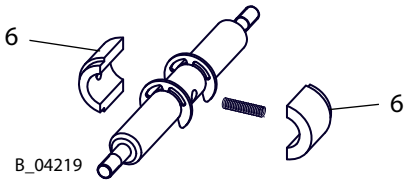


B_04217

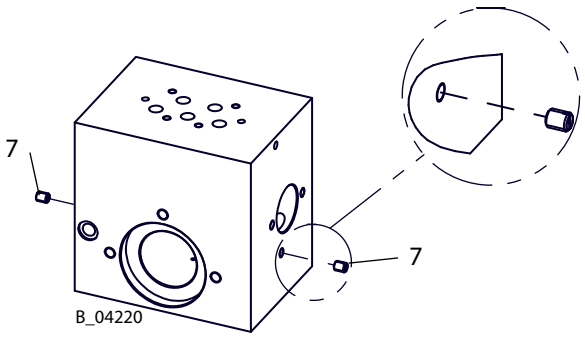
e) Clamp the end of the shaft released from the diaphragm in a bench vice (with soft jaws to avoid damaging it). Dismount the central nut from the opposite end of the shaft. Remove the second diaphragm.
f) Remove the inner diaphragm cover (3).
g) Remove the shaft (4) from the motor block.
h) Dismount the fast discharge valves (5), then remove their gaskets.



i) Clean all parts and check their condition. Replace defective parts.
j) Check the internal cylindrical area of the motor. It must be clean and smooth (without any scratches).
k) Check the sliding shoes (6; two halves) for wear and replace if necessary.

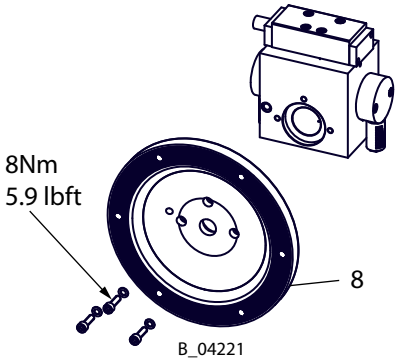


l) Check the two vent screws (7) on the motor block. Their passages must not be clogged.

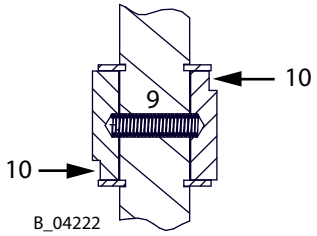


In the following assembly instructions, apply the right torques, greases and glues according to Chapter 10.2!

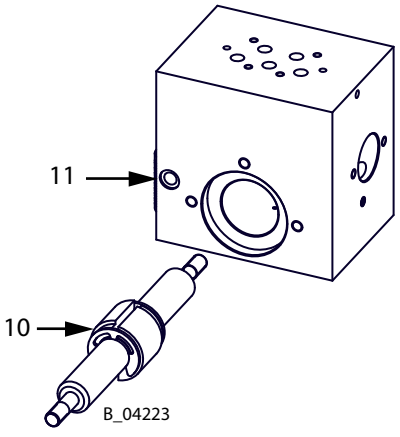
m) Mount one internal diaphragm cover (8) on the motor block, with the appertaining seals and shaft guide bushing.



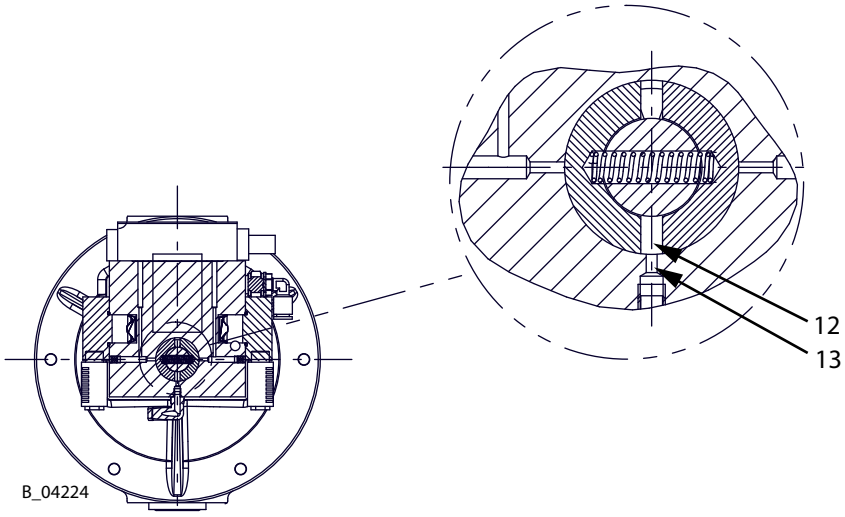
n) Insert the spring (9) in the cross hole of the shaft, and grease it at the ends.
o) Put the two halves of the sliding shoe on the shaft, make sure to keep the steps (10) opposite each other.



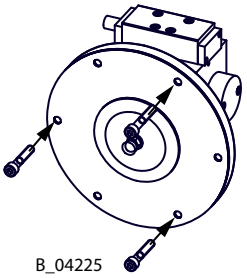
p) Insert the shaft with the sliding shoe into the motor block, making sure that the steps (10) are each aligned in the direction of the drillings (11) in the block (according to the figure, analog to the backside).



q) Rotate the shaft, so that the gap (12) between the two halves of the sliding shoe is aligned with the air connection hole (13).
Note: The gap (12) needs to be vertical, when the pump is in the operating position.



r) Hold the end of the shaft (without inner diaphragm cover) in a bench vice (with soft jaws to avoid damage).
s) Mount first diaphragm with the appertaining seals and O-rings on the opposite side of the shaft.
t) Align the diaphragm's holes with the holes in the inner diaphragm cover. Insert three of the six fixing screws, to prevent any rotation. Screw on the diaphragm's central nut.
u) Remove the motor block from the bench vice. Mount the second inner diaphragm cover.
v) Mount the second diaphragm with the relevant seals and O-rings. Align the diaphragm's holes with the holes in the inner diaphragm cover and insert three screws as on the other side. Screw on the diaphragm's central nut.
w) Mount the first external diaphragm cover: first remove the three screws, then secure it with all six screws.
Mount the second external diaphragm cover in the same manner.
x) Before mounting the fast discharge valves, check the condition of the seals and replace them if necessary. Check the installation position of the seals. Replacement of the air mufflers is recommended.
y) Check if the reversing valve is contaminated by pumped fluid and replace if needed. Mount the reversing valve.
z) Suction and delivery manifolds: Check and insert the non-return valves and their appertaining seals. Mount the suction and delivery manifolds. Apply the right torques according to the directions in Chapter 10.2.



9.4 CLEANING / REPLACEMENT OF THE SUCTION AND DELIVERY NON-RETURN VALVES

a) Remove the suction and delivery manifold.
b) Remove the seals, seats and balls from the diaphragm covers and the manifold's housings.
c) Check the condition of wear of the ball guide/stops inside the diaphragm cover and manifold. Replace if worn.
d) Remove all dirt particles as well as hardened material residues. Check the balls and seats for excessive wear. Clean or replace the components.
e) Clean the contact surfaces of the manifolds and the diaphragm cover and mount the components. Apply the right torque according to the directions in Chapter 10.2.

It is recommended that the static seals be replaced when reassembling.

9.5 REPLACEMENT OF THE REVERSING VALVE

a) Unscrew the reversing valve.
b) Put the new reversing valve in its housing.

During the performance of the operations described above, check the positioning of the valve's seals.

9.6 MATERIAL HOSES

The lifetime of the fluid hoses is, even with appropriate handling, reduced due to environmental influences.

→ Check hoses, pipes and couplings every day and replace if necessary.
→ As a precaution fluid hoses should be replaced after a period specified by the plant operator.

⚠ WARNING

Bursting hose, bursting threaded joints!
Danger to life from injection of material.

→ Ensure that the hose material is chemically resistant to the sprayed materials.
→ Ensure that the spray gun, threaded joints and material hose between the device and the spray gun are suitable for the pressure generated in the device.

9.7 DECOMMISSIONING

When the equipment must be scrapped, please differentiate the disposal of the waste materials. The following materials have been used:

→ Steel
→ Aluminum
→ Elastomerics
→ Plastics

The consumable materials (paints, adhesives, sealers, solvents) must be disposed of according to the valid specific standards.

10 SPARE PARTS

10.1 HOW CAN SPARE PARTS BE ORDERED?

Always supply the following information to ensure delivery of the right spare part:

Order number, designation and quantity
The quantity need not be the same as the number given in the quantity column "**Stk**" on the list. This number merely indicates how many of the respective parts are used in each module.

The following information is also required to ensure smooth processing of your order:
- Billing address
- Delivery address
- Name of the person to be contacted in the event of any queries
- Type of delivery (normal mail, express delivery, air freight, courier)

Identification in spare parts lists

Explanation of column "**K**" (labeling) in the following spare parts lists:

◆ Wearing part
Note: No liability is assumed for wearing parts.

● Not part of standard equipment, available, however, as additional extra.

⚠ WARNING

Incorrect maintenance/repair!
Risk of injury and equipment damage.

→ Have repairs and part replacements be carried out only by specially trained staff or a WAGNER service center.
→ Before all work on the device and in the event of work interruptions:
- Switch off the energy/compressed air supply.
- Relieve the pressure from the spray gun and device.
- Secure the spray gun against actuation.
→ Always follow the operating and service instructions at all times when carrying out work.

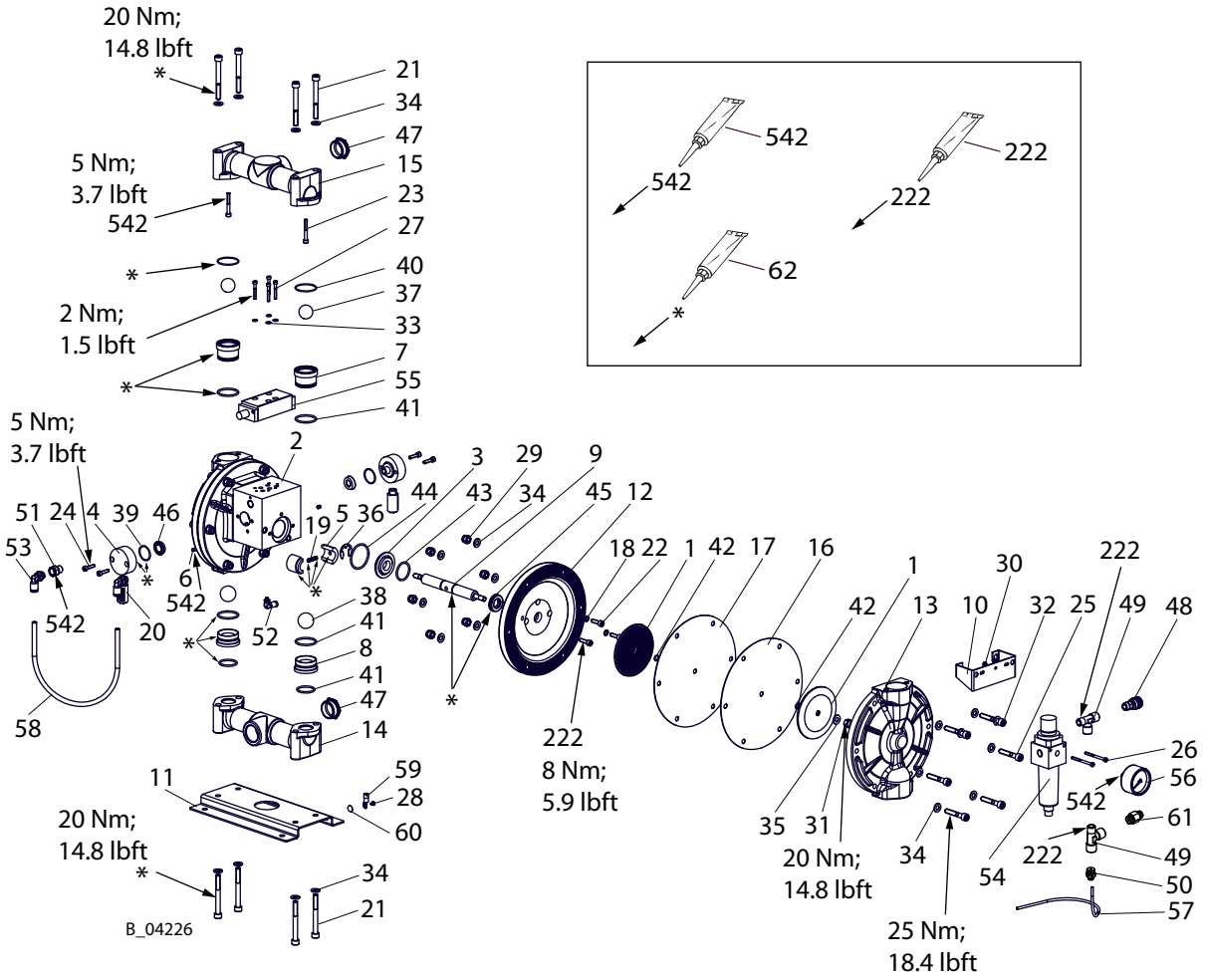
10.2 PM500 PUMP

PM500

			U509.A0	U509.A0A	
Pos	**K**	**Stk**	**Order No.**	**Order No.**	**Designation**
		1	U509.A0	U509.A0A	DDP PM500 paint
1		4	A327.22		Diaphragm disc
2		1	A328.01		Motor block
3		2	A330.04		Piston bushing
4		2	A331.01		Discharger flange
5		1	A337.08		Sliding shoe block (set)
6		2	A414.04		Bleed Screw
7		2	A673.03		Delivery valve seat
8	◆	2	A674.03		Valve seat
9		1	D410.12		Motor Piston
10		1	E309.62		Support, 1/4 FR
11		1	E315.62		PM 500/S Pump Support
12		2	F109.01		Inner Cover
13		2	F144.21	F144.01	Outer Cover
14		1	F145.21	F145.01	Suction manifold
15		1	F146.21	F146.01	Delivery manifold
16	◆	2	G702.05		PM 500 PTFE Diaphragm, white
17	◆ ★	2	G705.06		PM 500 Diaphragm Motor, black
18	◆ ★	6	G709.07		M Valve Screw
19		1	H209.03		Spring
20	◆	2	H505.07		Silencer
21		8	K106.62		Allen screw, M8x75 SS
22		6	K107.62		TCEI Screw, M6x20
23		2	K118.03		Screw, M5x40
24		4	K131.62		Screw, M5x20
25		10	K146.62		Screws, M8x45
26		2	K166.62		Screw, M4x50
27		4	9900386		Hexagon socket cylinder head screw
28		1	K199.62		Round tapping screw, 3.5x6.5
29		12	9910208		Self-locking hexagon nut, M8
30		2	K317.62		Nut, M4
31		2	K319.03		Cap nut, M8, stainless steel
32		2	K1003.62		Allen screw, M8 x 50
33		4	9920104		Washer, A4.3
34		34	9920102		Washer, A8.4
35		2	K521.03		Washer
36		2	K606.02		Lock washer for waves
37	◆	2	K804.03		Ball, 1"
38	◆	2	K814.03		Ball, 1 1/8"

◆ Wearing part

★ included in service set


20 Nm;
14.8 lbft
5 Nm;
3.7 lbft
542
2 Nm;
1.5 lbft
5 Nm;
3.7 lbft
222
8 Nm;
5.9 lbft
20 Nm;
14.8 lbft
20 Nm;
14.8 lbft
25 Nm;
18.4 lbft
B_04226

PM500

			U509.A0	U509.A0A	
Pos	**K**	**Stk**	**Order No.**	**Order No.**	**Designation**
39	◆ ★	2	L126.06		O-ring
40	◆ ★	2	L151.06		O-ring
41	◆ ★	6	L107.06		O-ring
42	◆ ★	6	L123.06		O-ring
43	◆ ★	2	L116.06		O-ring
44	◆ ★	2	L127.06		O-ring
45	◆ ★	2	L408.06		Gasket, DI.18
46	◆ ★	2	L415.06		Outlet seal
47		2	M033.07		Cover 1" M
48		1	M209.04		Nipple with adjusting collar, 1/4
49		2	M218.04		T nipple, FFM 1/4
50		1	M225.04		Quick fitting, D M 1/4 X 4
51		1	M239.00		Nipple, D MF 1/4"
52		1	M303.00		Quick fitting, L M5X4
53		2	M336.00		Plug-in nipple, rotating
54		1	P124.00M		Filter regulator, CZ 1/4
55	◆	1	P498.00		Reversing valve, P/1 SP/NUM
56		1	P903.00		Pressure gauge, 010 1/8X52
57		1	S424.07		Hose control, MT.0,330
58		1	S426.07		Hose, MT.0,400
59		1	Y622.00A		Cable lug
60		1	Z510.00		Adhesive label (grounding)
61		1	2336253		By-pass valve, 10.5 bar
62		1	Z125.00		Grease
222		1	9992590		Loctite 222
542		1	9992831		Loctite 542
			T933.00		Service set

◆ Wearing part

★ included in service set

11 GUARANTEE AND CONFORMITY DECLARATIONS

11.1 IMPORTANT NOTES REGARDING PRODUCT LIABILITY

As a result of an EC regulation effective from January 1, 1990, the manufacturer shall only be liable for his product if all parts originate from him or are approved by him, and if the devices are properly mounted, operated and maintained.
The manufacturer will not be held liable or will only be held partially liable if third-party accessories or spare parts have been used.
With genuine WAGNER accessories and spare parts, you have the guarantee that all safety regulations are complied with.

11.2 WARRANTY CLAIM

Full warranty is provided for this device:
We will at our discretion repair or replace free of charge all parts which within 36 months in single-shift, 18 months in double-shift or 9 months in triple-shift operation from date of receipt by the purchaser are found to be wholly or substantially unusable due to causes prior to the sale, in particular faulty design, defective materials or poor workmanship.
The type of warranty provided is such that the device or individual components of the device are either replaced or repaired as we see fit. The resulting costs, in particular shipping charges, road tolls, labour and material costs will be borne by us except where these costs are increased due to the subsequent shipment of the device to a location other than the address of the purchaser.
We do not provide warranty for damage that has been caused or contributed to for the following reasons:
Unsuitable or improper use, faulty installation or commissioning by the purchaser or a third party, normal wear, negligent handling, defective maintenance, unsuitable coating products, substitute materials and the action of chemical, electrochemical or electrical agents, except when the damage is attributable to us.
Abrasive coating products such as red lead, emulsions, glazes, liquid abrasives, zinc dust paints and so forth reduce the service life of valves, packings, spray guns, nozzles, cylinders, pistons etc. Wear and tear due to such causes are not covered by this warranty.
Components that have not been manufactured by WAGNER are subject to the original warranty of the manufacturer.
Replacement of a component does not extend the period of warranty of the device.
The device should be inspected immediately upon receipt. To avoid losing the warranty, we or the supplier company are to be informed in writing about obvious faults within 14 days upon receipt of the device.
We reserve the right to have the warranty compliance met by a contracting company.
The services provided by this warranty are dependent on evidence being provided in the form of an invoice or delivery note. If the examination discovers that no warranty claim exists, the costs of repairs are charged to the purchaser.
It is clearly stipulated that this warranty claim does not represent any constraint on statutory regulations or regulations agreed to contractually in our general terms and conditions.

J. Wagner AG

11.3 CE DECLARATION OF CONFORMITY

Herewith we declare that the supplied version of the pneumatic double diaphragm pumps with Order No.

PM500
U509.A0
U509.A0A

comply with the following guidelines:

2006/42/EC	94/9/EC Atex Directive

Applied standards, in particular:

DIN EN ISO 12100: 2011	DIN EN 809: 2012	DIN EN ISO 4413: 2011
DIN EN ISO 4414: 2011	DIN EN 12621: 2011	DIN EN 1127-1: 2011
DIN EN ISO 13463-1: 2009	DIN EN ISO 13732-1: 2008	DIN EN 14462: 2010

Applied national technical standards and specifications, in particular:

BGR 500 part 2 Chapter 2.29 and Chapter 2.36	TRBS 2153

Labeling:

CE Ex II 2G IIB T4 +4°C Tamb +40°C

EC Certificate of Conformity
The CE certificate of conformity is enclosed with this product. If needed, further copies can be ordered through your WAGNER dealer by specifying the product name and serial number.
Order No.: 2335753

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Order No. 2335747

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